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Solid waste recycling
research at the Forest

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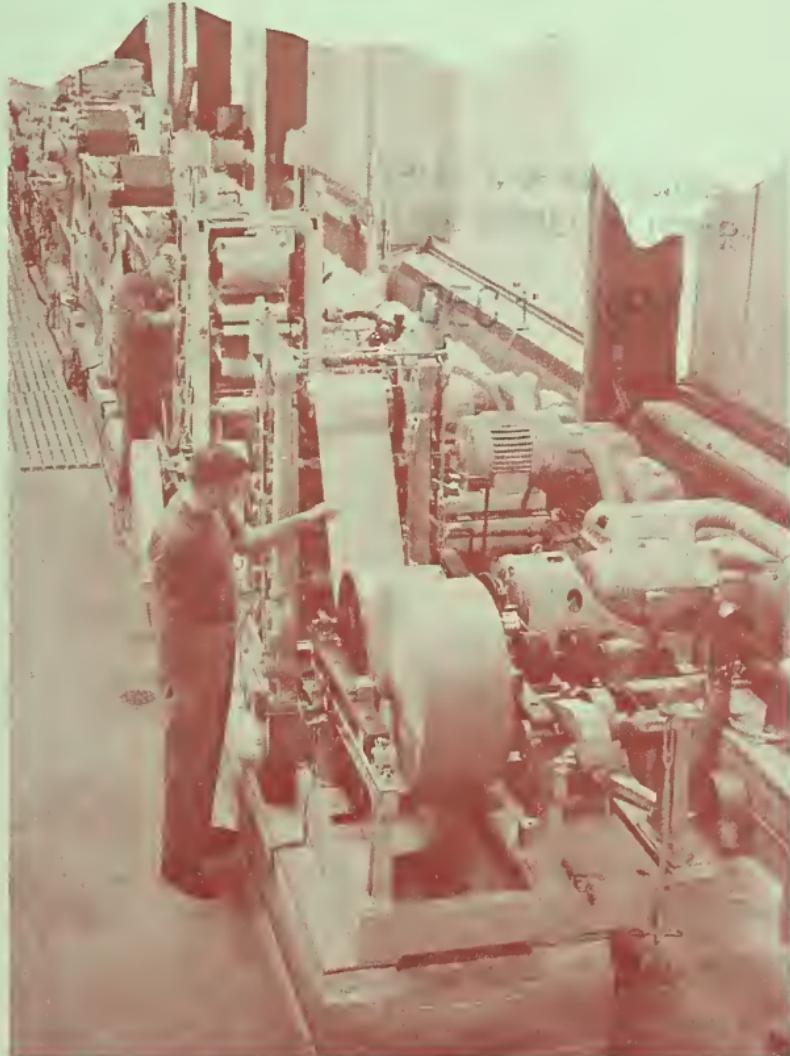
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SOLID WASTE RECYCLING RESEARCH

at the
Forest Products Laboratory

Forest Service
U.S. Department of Agriculture



An Environmental Mission

Environmental problems are not new, and neither is the concern of the Forest Products Laboratory with them. For more than half a century the FPL, national wood research center of the Forest Service, has solved technical problems related to effective utilization of our forest resources. A broad range of research designed to increase processing yields, add to product usefulness and durability, and provide techniques for improved use of wood in structures contributes to improvement of the quality of life in America.

This pamphlet outlines FPL recycling research, an area that has received unprecedented attention from the public and press.

Goal

Develop new and improved system alternatives for economic recovery and reuse of the paper and solid wood portions of municipal solid waste.

Why?

Per capita consumption of paper and paperboard in the United States is more than a quarter ton per year. Most of this material becomes solid waste after a single use. Solid wood wastes . . . demolition debris, pallets and crates, railroad ties, piling, and trees removed by cities . . . add an even larger amount of potential raw material to our "urban forests" each year.

American cities spend over \$4.5 billion annually to collect and dispose of all types of solid waste, and disposal methods frequently contribute to air and water pollution. By the early 1980's, solid discards are expected to exceed a half billion tons each year.

A growing population is placing new demands on our forests for products from sawtimber and pulpwood. The Forest Service estimates that the demand for wood will exceed annual growth,

perhaps by the mid-1980's, if improvements in forest management and wood utilization are not made.

Increased recycling can provide major benefits in reducing solid waste disposal problems, checking pollution, and relieving forecast pressures on the timber supply.

Don't our industries recycle now?

Indeed they do; about 19 percent of the wood fiber processed into paper products in the United States is recycled. But the percentage has declined steadily since World War II years. There are many reasons for this. A major one is the lack of effective systems for retrieving and processing wastepaper. Urban solid wood wastes are usually completely overlooked as a source of raw material. The wood and paper destroyed in our cities through disposal each year is a very large mass of material, and may be equivalent to more than 5 billion cubic feet of timber.

What is being done?

Forest Products Laboratory recycling research is an integrated program to identify and solve major technical problems. Each phase of the research relates to other phases, and cooperation with industry and other research organizations is essential. This discussion divides the FPL program into five general categories for convenience, but in practice there is no such division.

DEFINING THE WASTES

An important phase of recycling research is to gather sound information on the quantity, quality, and location of urban wastepaper and solid wood wastes. This work is essential if decision makers are to make sound judgments concerning recycling these materials. Several publications have been issued defining mixed wastepaper from households, which is about one-third of annual

U.S. paper consumption and seldom is recycled now. Similar information is being developed, in cooperation with others, for urban wood wastes such as those from demolished homes, discarded furniture, containers, and timbers used for many purposes. More effective utilization of wastepaper discarded where large numbers of people congregate--in office buildings, factories, and supermarkets--also requires better information on the quality, quantity, and location of this material.

CONTAMINANTS

Materials other than the wood or wood fiber that are added to a product during manufacture, conversion, use, or disposal present another research problem. These contaminants often prevent economic recycling.

An example of results from research in this area is publication by two Laboratory scientists of details of a practical method for removing wax treatment material from used corrugated containers. The wax coatings, while effective in making containers resistant to moisture, could not be removed by secondary fiber plants without special equipment. This research demonstrated a way to process 1 million tons of waste corrugated material annually--material presently considered suitable only for disposal.

Studies are being initiated to learn the effect on recycling of other paper and solid wood product contaminants, such as creosote used to preserve railroad ties and piling. Successful research in this area can contribute a great deal to the recycling potential of types of waste recoverable in both separate and joint collections.

SEPARATION PILOT PLANT

A pilot plant has been established by the Laboratory to study and demonstrate techniques for separating wastepaper from household refuse, and separating the paper into several grades. This installation utilizes air currents to make separations from refuse hammer milled to smaller particle sizes at the City of Madison's Refuse Reduction Plant. The research aims to develop and show the potential of this type of system for eventual full-scale application by municipalities or industry.

PRODUCTS AND PROCESSES

There is no benefit in making new separate collections feasible and developing methods to separate paper from mixed waste if the recovered material cannot be processed into high-volume products that are in demand.

Initially, the Laboratory emphasized paper in its recycled products research. But new information showed that a continual round of paper-to-paper recycling is not necessarily the best approach to solving urban solid waste and timber supply problems. Pulp from the solid wood wastes for paper and paperboard production is a definite product possibility. Structural products--fiberboards for the building and manufacturing industries--offer many advantages as outlets for fiber from both wastepaper and solid wood wastes.

Fiberboards are now in demand as siding for houses, paneling, ceiling tile, insulation board, and furniture parts. They can be produced by dry, nonpolluting processes. They could be produced economically from secondary fiber in cities where raw material, a labor force, and markets are concentrated. Board-type products have more direct impact on the timber supply than other types of fiber products.

In addition to seeking ways to utilize secondary fiber in current products, FPL research is concerned with processing systems for entirely new fiberboards with improved strength properties. Markets for such products will open and grow as demand for housing increases in the years ahead. And structural products last for years in houses. They do not return quickly to the solid waste stream.

OUTLETS FOR FINES

Volume outlets also are needed for "fines," shortened fibers not generally useful in paper-making or production of structural materials. Possibilities for utilizing this component of solid waste include cattle feed, paint extenders, adhesives, and fuel to provide energy.

Other products, such as compost material, are possible outlets for recycled fiber. FPL research planning recognizes that urban solid waste varies in composition from area to area and a variety of product outlets will be necessary to utilize it. Systems engineering emphasizes flexibility, so that no restriction is imposed by any particular final product.

Will recycling eliminate disposal soon?

No, not if "soon" means this year or next. But progress is being made in developing methods that will permit the public and industry to increase recycling. The recycle level for wood and wood fiber products will rise in the United States as changes are made in existing systems and new systems are developed, tested, and adopted.

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